IPM Project report 17 Feb 16

1. **Title: Native pollinator conservation: A sustainable-campus initiative supporting research and education on the role of native plant propagation in promoting pollinator conservation.**
2. **Project Leaders (All are faculty and staff at SUNY Cobleskill- Carmen Greenwood PI):**

Carmen Greenwood, Ph.D. – Entomologist (pollinator census) email: greenwcm@cobleskill.edu

3. Cooperators (all are faculty and staff at SUNY Cobleskill)

- Tim Marten, M.S. – Horticulture/native wildflowers (plant selection and bloom census)
- Andrew Gascho Landis, Ph.D. – Environmental Science (plant selection and bloom census)
- Alex Ellram, Ph.D. – Integrated Pest Management/Plant Pathology (plant selection, pest impacts)
- James Hardin, Ph.D. – Agricultural Engineering (interactive counter & signage installation)
- Tom Poltynski – SUNY Cobleskill Farm manager (plot preparation, maintenance)
- Jedadiah Radliff – Plant Sciences instructional support technician (plot preparation)

4. **Abstract**

As a small sustainability-focused agricultural college, SUNY Cobleskill provides an ideal diversity of expertise, cropping and horticultural systems and educational/outreach infrastructure to implement a replicated series of native wildflower plots aimed at conserving native pollinators. These plots would allow us to evaluate the efficacy of different native plant combinations, at attracting native pollinators, and, to census the local community of native insect pollinators, both seasonally, and long term. Additionally, signage at the site would serve as an educational venue for courses offered on campus, and the large number of visitors that frequent the campus.

5. **Background and Justification:**

Native pollinator decline in the U.S. has been well documented over the last hundred years in direct relation to a wide range of land use practices (Potts et al., 2010). Changing paradigms within agriculture, land development, fragmentation, introductions of monocultures and non-native plant and insect taxa have all served to challenge the diversity and abundance of native pollinators. Governmental agencies charged with conservation of ecologically important fauna are working to integrate conservation of beneficial invertebrates, such as pollinators and insect natural enemies into existing land management protocols. Insect pollinators are particularly important in that they support a large proportion of modern food production and often perform additional ecosystem services as natural enemies of insect pests.

The project proposed here would serve as a demonstration of the importance of native pollinators and an outreach tool, in combination with educational signage that would increase awareness and

provide community members with educational resources on how they can also contribute to native pollinator conservation. The campus setting would allow researchers to quantify the germination and bloom rates of the different seed mixtures, and the relative abundance, diversity and community composition of native insect pollinators that are attracted to the plots.

SUNY Cobleskill will be implementing fruit plots and a small orchard as well as a small farm demonstration of sustainable agricultural practices within the next 2 years. At least one set of native pollinator plots will be implemented in the location designated for the small farm demonstration unit so that it may be integrated into the overall display of integrated sustainable small farm practices, designed to educate regional small scale producers, as well as students.

6 & 7 Objectives and Procedures for each:

a. Develop a research platform for studying the efficacy of different mixtures of native wildflowers at attracting native insect pollinators, including bees, wasps, moths/butterflies, flies and beetles.
   - Resources and timeline: The Plant materials program of the USDA -NRCS has long been involved in evaluating and selecting plants for a wide range of conservation applications. Pollinator Partnership and The Xerces Society have also developed regionally-specific planting guidelines aimed at conserving and enhancing native pollinator communities, which will be utilized in selecting plant taxa. Plant selection, plot preparation and signage construction will begin in June of 2016. Census activities will begin in late summer of 2016 and full season census will begin in 2017 and continue annually thereafter.
   - Replicate plot design: Three sets of replicated pollinator plots will be established in high visibility areas of the campus. Treatments will consist of annual, perennial and mixed varieties of native wildflowers that are currently recommended on the list of pollinator species for northeast region, to include a minimum of 3 early, mid and late flowering varieties including at least two taxa that bloom nocturnally. Each plot will be approximately 2m x 20m. Two reputable seed providers have been recruited for this study who can provide a customized blend of native wildflowers. Planted seed mixtures will be evaluated for germination rate, bloom rate and timing of bloom throughout the growing season on an annual basis. Sampling will be conducted at weekly intervals through the growing season each year. For each plot, the presence and abundance of each plant species with at least one flowering individual will be noted. Abundance of flowering individuals will be classified and recorded using the following log-based categories: 0, 1, 2-3, 4-7, 8-15, 16-31, 32-63, 64+. Abundance will refer to the number of flowering stems emerging from the ground.
   - Pollinator census: A timed observation of 3 (1m) quadrats per plot will be documented each day. Belt transects (2m wide parallel) through each of the plots will be sampled using sweep nets every 2 weeks through the growing season. Bee pans (yellow and blue) containing a detergent solution will be positioned (alternating colors in a staggered zig zag pattern the length of the plot) one day out of each week throughout the growing season. On each sampling date pans will be positioned from 8am EST to 12pm EST and from 12pm EST to 4pm EST to discern crepuscular vs. diurnal activity. (Roa and Stephen 2009; Stephan and Rao 2007; Stephen and Rao 2005; Goulson et. al., 2002, Clare, et.al. 2000). Malaise traps will be positioned within each of the plots at sundown and retrieved at dawn for at least one night in each of the plots early, mid and late season to assess nocturnal pollinators.

- All pollinators collected will be identified to species (or genus) and evaluated at the levels of abundance, diversity and community composition. Data will be compiled seasonally and annually with the goal of establishing long term trends of native pollinator activity.

b. Use the established native pollinator conservation plots as an educational/outreach tool to increase awareness of the importance of native pollinators and how individuals can contribute to their conservation.
   - Plots will include signage that explain the study design and provides images and natural history about some of the locally important groups of native insect pollinators.
   - These plots will also provide opportunities for undergraduate students in courses such as "Native Wildflowers," "Entomology," "Sustainable Agriculture," "Conservation Biology" and other courses offered here at SUNY Cobleskill, to participate in experiential learning opportunities. Students may participate in planting activities or census of blooms and pollinators and present their data at scientific meetings.

Project evaluation

- The number of people that visit the pollinator plots will be quantified through an interactive device that will be implemented at each of the sites to determine the extent of the impact on the community.
- The number of students that use the pollinator plots as the basis for individual studies to present at scientific conferences will be documented.
- Data regarding bloom rate, germination success and pollinator census will be compiled seasonally, and published or presented locally.

8. Results and Discussion:

Accomplishments:

- Six locations have been identified on campus for placement of native pollinator conservation plots. Approval of site locations was confirmed by administration, campus facilities and campus farm manager.
- Plots have been designed by Tim Marten (landscape architect)
- Seeds have been purchased for wildflowers and native brambles. Some seeds are currently under propagation in the greenhouse. Supplies have been purchased for bed preparation and seeding
- Educational signage has been designed and image copyrights obtained for artwork.
- Students have constructed native bee boxes to be installed at the sites.
- Counting mechanism to document the number of people who visit the site has been designed and parts ordered.

Yet to be accomplished:

- Purchase of supplies for insect surveys (will be done this week)
- Purchase of additional planting supplies & native flowering brambles will be done this week
- Signs will be ordered within the next two weeks.

9. Project location

All pollinator plots will be installed on the campus of the State University of New York at Cobleskill in Scoharie Co. New York